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Government management of contractor submission of value engineering change proposals

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NAVAL POSTGRADUATE SCHOOL
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THESIS

GOVERNMENT MANAGEMENT OF CONTRACTOR
SUBMISSION OF VALUE ENGINEERING
CHANGE PROPOSALS

by

Gary George Given

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Government Management of Contractor Submission of Value Engineering Change Proposals

by

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ABSTRACT

The purpose of this thesis is to determine how the Department of Defense value engineering policies and processing procedures affect a contractor's motivation to submit value engineering change proposals. A comparative analysis of the DOD Value Engineering Program with private industry's value analysis program and also an examination of how the Hughes Aircraft Company has used the DOD Value Engineering Program, resulted in three conclusions. The first conclusion is that the incentives offered by the DOD Value Engineering Program have been found by private industry to be ineffective in attracting supplier participation in value analysis. The second conclusion is that delays in incorporating the VECP in the end-item significantly reduces a contractor's motivation to submit future VECPs. The third conclusion is that the contractor's perception of the government buying activity's willingness to fairly evaluate VECPs is the most significant influence on a contractor's motivation to submit VECPs.

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I. INTRODUCTION

A. OVERVIEW

The purpose of this thesis is to develop an understanding of how the Department of Defense value engineering change proposal (VECP) policies and processing procedures affect a contractor's motivation to submit VECPs. This chapter will provide a definition of value engineering (VE) as well as a brief history of the origins of value engineering, a statement of the research problem, a statement of the research objectives, the research questions to be addressed, the research scope, and a statement of the research methodology.

B. DEFINITION OF VALUE ENGINEERING

The basic premis is that the functions of a product, whether it be a weapon system for the Government or a consumer good which results in its performance meeting the requirements of the customer, can be identified [Ref. 1:p. 11]. Understanding the desired function of a product is the basis for determining the value of a product. Value engineering is therefore an engineering tool by which the functions of a product are defined and which utilizes the latest technical information available to develop lower cost engineering and manufacturing solutions and alternatives to satisfy the desired function [Ref. 1:p. 13]. Value engineering attempts to answer the following questions:

1. What is the item?

2. What does it cost?

3. What does it do?

4. What else would do the job?

5. What would that alternative cost?

Value engineering within the Department of Defense is defined by the Federal Acquisition Regulation as:

> The formal technique by which contractors may (1) voluntarily suggest methods for performing more economically and share in any resulting savings or (2) be required to establish a program to identify and submit to the Government methods for performing more economically. Value engineering attempts to eliminate, without impairing essential functions or characteristics, anything that increases acquisition, operation, or support costs. [Ref. 2:p. 48-2]

This definition gives value engineering the appearance of being similar to a beneficial suggestion program but with an emphasis on cost reduction. It is really meant to be more than that. DOD Handbook 5010.8H provides a definition of value engineering to be:

> . . . a systematic effort directed at analyzing the functional requirements of DOD systems, equipment, facilities, procedures, and supplies for the purpose of achieving the essential functions at the lowest total cost, consistent with the needed performance, reliability, quality, and maintainability. [Ref. 3:p. 1]

C. HISTORICAL BACKGROUND: THE ORIGINS OF VALUE ENGINEERING

During WW II, shortages of critical materials forced manufacturers to utilize substitute materials and to alter designs to conserve scarce materials. The General Electric Company closely monitored the performance of the substitute materials that were used in their products and found that

they provided equal or better performance at less cost. It was this observation that caused General Electric to more closely examine how product efficiency could be improved by developing substitute materials [Ref. 4:p. 1].

In 1947, General Electric assigned Mr. Lawrence D. Miles, a staff engineer, to design a methodology through which the value of a product could be developed. Through a collaboration with Mr. Henry Erlicker, who was Vice-President in charge of purchasing, a successful methodology was developed which they called "Value Analysis." Initial tests of this methodology were highly successful and their first value analysis project resulted in a $200,000 per year savings to General Electric. [Ref. 5:p. 3]

The results of General Electric's value analysis projects were widely publicized and the concept spread very quickly as private industry began to understand the potential for large returns on relatively modest investments [Ref. 4: p. 1]. In 1954, Rear Admiral Leggett of the U.S. Navy Bureau of Ships set up, with the assistance of General Electric, a value analysis program for Navy ship construction. The Navy's program for ship construction was very successful and led to the Army adopting a similar program in 1955 [Ref. 5:pp. 1-3].

Since the concept of value analysis was first developed, it has been called by a host of names including value engineering, value management, and value improvement. All of these are essentially synonymous with one another. However,

today, a distinction has developed between the terms value analysis and value engineering. The term "value analysis" is typically associated with the commercial sector of private industry and is principally accomplished by purchasing personnel. The term "value engineering" is typically associated with the Department of Defense and its major contractors and is principally accomplished by design engineers.

In the early 1960s, Secretary of Defense McNamara's Cost Reduction Program brought about the adoption of value engineering for all of the DOD and the establishment of the Directorate of Productivity and Value Engineering within the Office of the Assistant Secretary of Defense (Installations and Logistics). In 1964, the first value engineering clause was incorporated into the Armed Services Procurement Regulation (now the Federal Acquisition Regulation). This clause provided an incentive to the contractor to develop cost saving ideas by allowing the contractor to share in the net savings resulted from the incorporation of value engineering changes. [Ref. 5:p. 3]

The increased emphasis on value engineering that was generated by the Cost Reduction Program resulted in a number of seminars and conferences. It is worthwhile to note that one of the most common points made during these seminars and conferences was that the Government really did want to have a value engineering program. It would seem that a large number of people from both private industry and the Department

of Defense were indifferent toward value engineering and possible saw it as just one more cost reduction program that would soon go out of favor. At a 1969 Value Engineering Conference at the U.S. Air Force Academy, Lieutenant General H. E. Goldsworthy stated,

> I have been asked to address the rhetorical question: "Does the Air Force really want value engineering?" The answer is obviously a resounding and unqualified, "Yes." Otherwise, I am sure we wouldn't be here. Why do we bother, then, to ask the question? Since its inception, the VE program has been beset with misunderstanding and inhibiting inuendo. It has been necessary for us to constantly reassure our contractors of our sincere intentions. This conference is only one of many such efforts. Though we believe much progress has been made in gaining a better understanding, much remains to be done. [Ref. 6:p. 33]

As interest in McNamara's Cost Reduction Program waned, so did interest in value engineering. However, with the introduction of DOD Directive 5000.1 in July 1971 with its design-to-cost concept, interest in value engineering was revived. VE was seen as a methodology by which design-to-cost objectives could be met. In February 1972, DOD Directive 5010.8, "Department of Defense Value Engineering," was issued and has remained the principle DOD policy guidance on value engineering outside of what is contained in the Federal Acquisition Regulation.

D. PROBLEM STATEMENT

The Department of Defense Value Engineering Program has been in existence since 1964. From its very beginning, value engineering has been surrounded by controversy and has experienced a number of peaks and valleys in terms of its

popularity within the Department of Defense. Today, with DOD budgets undergoing a high degree of scrutiny, the value engineering program has received renewed importance within the DOD as a cost cutting tool. With this renewed importance, DOD is concerned with how to motivate contractors to participate in the DOD Value Engineering Program in a meaningful way.

E. RESEARCH OBJECTIVE

The purpose of this thesis is to develop an understanding of how the Department of Defense value engineering change proposal policies and processing procedures affect a contractor's motivation to submit VECPs.

F. RESEARCH QUESTIONS

The primary research question is derived from the research objective and asks, "How do the Government's value engineering policies and processing procedures affect the contractor's motivation to submit value engineering change proposals?" Secondary research questions are: (1) What are the significant features of the DOD Value Engineering Program?; (2) How does the DOD Value Engineering Program compare with private industry's value analysis program for commercial products?; (3) How do DOD contractors view the DOD Value Engineering Program?; (4) How do DOD program managers and contracting officers view the DOD Value Engineering Program?; (5) How might the Department of Defense restructure its value engineering program so as to improve its effectiveness?

G. SCOPE

This thesis will develop an understanding of how DOD VECP policies and processing procedures affect a contractor's motivation to submit VECPs. To answer this research question, this thesis will bring together the results of surveys and research work that have already been completed and will also examine how a DOD contractor has used the DOD Value Engineering Program.

The Hughes Aircraft Company has been selected as the DOD contractor to be examined. There are three reasons for selecting Hughes: (1) Hughes has been an active participant in the DOD Value Engineering Program since it was first introduced; (2) Hughes builds technologically similar weapon systems for all three of the military services and has submitted VECPs on all of the weapon systems (TOW missile for the Army, the PHOENIX for the Navy, and the MAVERICK missile for the Air Force); and, (3) Hughes is one of the most experience defense suppliers.

The observations made concerning the problems and perceptions of the current value engineering program will therefore be made within the context of the interface between the Hughes Aircraft Company's missile Systems Group, its program offices and the purchasing agencies of the respective military services. This research effort will not address the DOD's in-house value engineering program.

H. METHODOLOGY

This research effort will be completed through the use of literature research and interviews with key value engineering personnel at the Navy's Naval Air Systems Command and the Army's Missile Command. Within the Hughes Aircraft Company, key value engineering managers at the corporate level and engineering personnel at the program level were interviewed.

The literature research includes a review of: (1) Professional journals and periodicals; (2) Research reports published by United States military postgraduate schools; and, (3) United States Department of Defense Publications.

II. DOD VE PROGRAM FOR CONTRACTORS

A. OVERVIEW

This chapter will describe the DOD Value Engineering Program for contractors as it is presently structured within Part 48 of the Federal Acquisition Regulation (FAR). The contractor program is structured around a Value Engineering clause which, with certain exceptions, is mandatory for all contracts over $100,000. The VE clause can be modified to accomodate two separate VE programs for contractors; an incentive program in which participation is voluntary and a mandatory program in which the Government requires and separately pays for a specific level of effort. The contractor develops and submits a value engineering change proposal to communicate their cost saving idea to the Government. The VE clause provides for a sharing of net savings with the contractor. The chapter will conclude with a statistical summary of how well the DOD VE program for contractors has performed.

B. VALUE ENGINEERING PROGRAM STRUCTURE

The DOD Value Engineering Program for contractors has two contractual approaches to it. The first is a voluntary approach in which the contractor uses his own in-house funding and personnel to develop and submit cost saving ideas. The second approach is a mandated program in which the

Government requires and pays for a specific value engineering program effort. In this case, the value engineering effort would be included as a separately priced item of work in the contract Schedule. [Ref. 2:p. 48-2]

Under both the voluntary program and the mandatory program, the contractor communicates cost saving ideas to the Government by means of a value engineering change proposal. A VECP is defined in the Federal Acquisition Regulation as:

> . . . a proposal that (a) Requires a change to the instant contract to implement; and (b) Results in reducing the overall projected cost to the agency without impairing essential functions or characteristics. [Ref. 2:p. 48-2]

Under this definition, a cost saving idea that can be implemented without a modification to the instant contract lies outside the scope of a VECP. However, this does not mean that the contractor would be prevented from implementing the cost saving idea on his own.

Cost savings under the Value Engineering Program can be categorized as being instant, concurrent, future, or collateral. Instant contract savings are the net cost reductions on the current contract under which the VECP is submitted and accepted. Concurrent contract savings are net reductions in the prices of other contracts for the same item that are definitized and ongoing at the time the VECP is accepted. For example, a contractor could be producing an item under several contracts. Although the VECP can be submitted under only one of the current contracts, the cost saving idea is applied to all contracts currently under production. Future

contract savings are the product of the estimated future unit cost reduction multiplied by the number of future contract units scheduled for delivery during the sharing period. Collateral savings are derived from a buying agency's measurable net reduction in overall costs of operating the end item which are attributable to the VECP. For example, an accepted VECP may have a measurable impact on fuel consumption or perhaps maintenance costs. [Ref. 2:p. 48-2]

The emphasis for all types of savings is on the net reduction in costs to the Government. It is quite possible for a VECP to reduce the costs of a component yet increase the costs of the system in which it is installed. For example, the Government may purchase an electronics assembly from contractor A and then give the assembly to contractor B as government furnished equipment (GFE) under a weapon system contract. If contractor A submits a VECP for the electronics assembly, it may very well reduce the costs of the electronics assembly but, when installed in the weapon system which is manufactured by contractor B, the costs of the overall weapon system may increase due to design changes that contractor B would have to make to accomodate the VECP.

Contractual implementation of value engineering is accomplished through the use of a Value Engineering clause. The clause can be altered to accomodate situations where a mandatory value engineering program is to be used or where both a mandatory and voluntary program are to be used. The unaltered

Value Engineering clause alone would be used when only a voluntary program is desired.

With a few exceptions, a Value Engineering clause is required by the Federal Acquisition Regulation to be in all solicitations and contracts that are $100,000 or more in value. If the contracting officer sees a potential for a significant savings, a Value Engineering clause may be included in contracts with a value of less than $100,000. A Value Engineering clause will not be included in contracts for research and development other than full scale development nor will it be included in contracts which provide product or component improvement unless the Value Engineering clause is restricted to areas not covered for product or component improvement. [Ref. 2:p. 48-4]

In choosing the type of VE clause to include in a contract, a contracting officer will evaluate whether or not the benefits from value engineering can only be realized through a regular and systematic effort. If they can, the mandatory value engineering program will be selected and a separately priced line item for value engineering effort will be included in the contract [Ref. 7:p. 5]. However, where the contract is for the production of an item that has a stable design and manufacturing process, the voluntary program is considered to be more appropriate [Ref. 7:p. 5].

FAR requirements for value engineering can create certain problems for the government contracting officer. In an environment where at least part of a systems development

contract is geared toward rewarding contractor achievement of cost goals through general efficiency and tradeoffs of nonessential performance requirements or specifications, the negotiator must not create a situation where VE incentives duplicate the overall contract incentive structure; but, must also affirmatively include a VE clause.

As has been the case with the DOD Value Engineering Program since it was first made a part of the Armed Services Procurement Regulation, the head of the procurring activity can still determine that value engineering is inappropriate for a single contract or a class of contracts in which it would otherwise be required.

Prior to 1974, the sharing rates for instant and future contract savings as well as the future sharing periods were not fixed. They were subject to negotiation between the Government and the contractor. Since 1974, the sharing rates and the sharing periods have become fixed. At the time the rates and sharing periods became fixed, there was the perception that the contractors were demanding the highest sharing ratio possible and then using it as a bargaining point for other concessions in the contract. The one exception to the fixed sharing rate is with incentive contracts. In this case, the share ratio may be the same as the overall contract incentive ratio. [Ref. 7:p. 18]

Table 1 shows the current Government/Contractor sharing ratios given in the Federal Acquisition Regulation's Value Engineering (Apr 1984) clause.

TABLE 1

GOVERNMENT/CCONTRACTOR SHARES OF VECP SAVINGS
(All Figures in Percent)

	Voluntary		Mandatory	
Contract Type	Instant	Future and Concurrent	Instant	Future and Concurrent
Fixed-price (other than incentive)	50/50	50/50	75/25	75/25
Incentive (fixed-price or cost)	*	50/50	*	75/25
Cost-reimbursement (other than incentive)	75/25	725/25	85/15	85/15

*same as the sharing ratio in the contract

Source: Federal Acquisition Regulation, Part 48.

C. DOD VALUE ENGINEERING PROGRAM STATISTICS

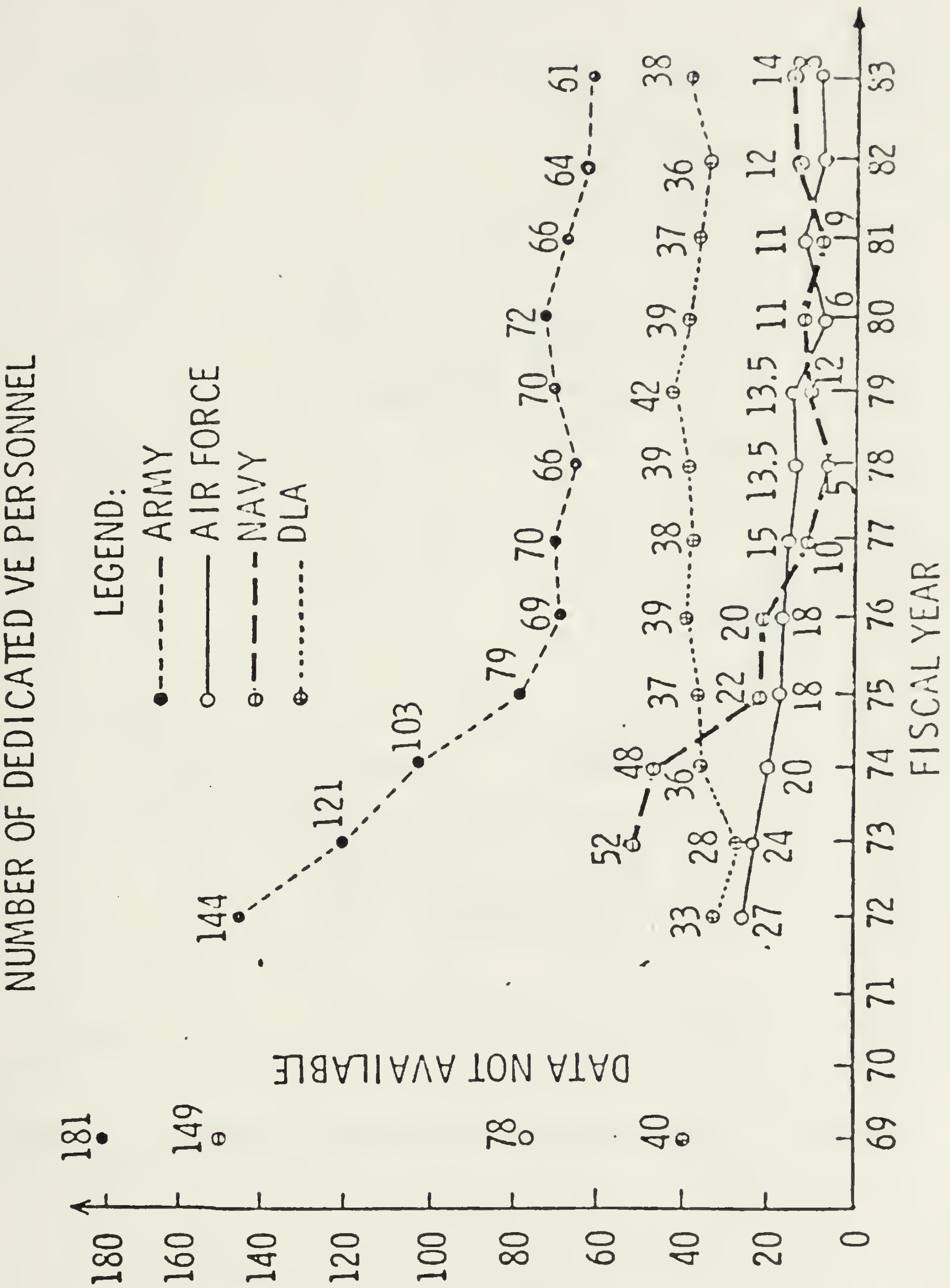
The data presented in Figures 1 through 4 were compiled by the DOD Product Engineering Services Office at the Defense Logistics Agency. All dollar values are expressed in constant 1984 dollars. Figure 1 shows the estimated VECP savings to the DOD since fiscal year 1967. As can be seen, the Value Engineering program has had a number of peaks and valleys in terms of the overall benefits derived by the Government. From its beginnings in fiscal year 1965, value engineering showed a phenomenal growth up until fiscal year 1971. It was in fiscal year 1971 that the principle of design-to-cost was first introduced. Even though value engineering was a way of facilitating the achievement of design-to-cost goals, emphasis was shifted away from the Value

SOURCE: DOD PRODUCT ENGINEERING SERVICES OFFICE

Figure 1

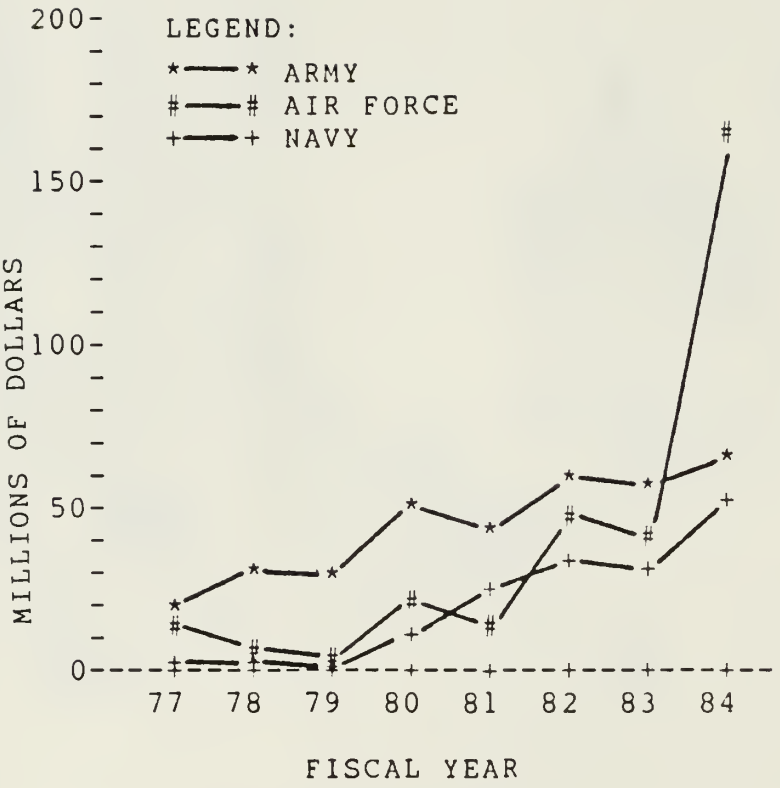
Estimated VECP Savings to DOD
(Contractor Program)

Expressed in Constant 1984 Dollars



SOURCE: DOD PRODUCT SERVICES OFFICE

Figure 2. Number of Dedicated VE Personnel

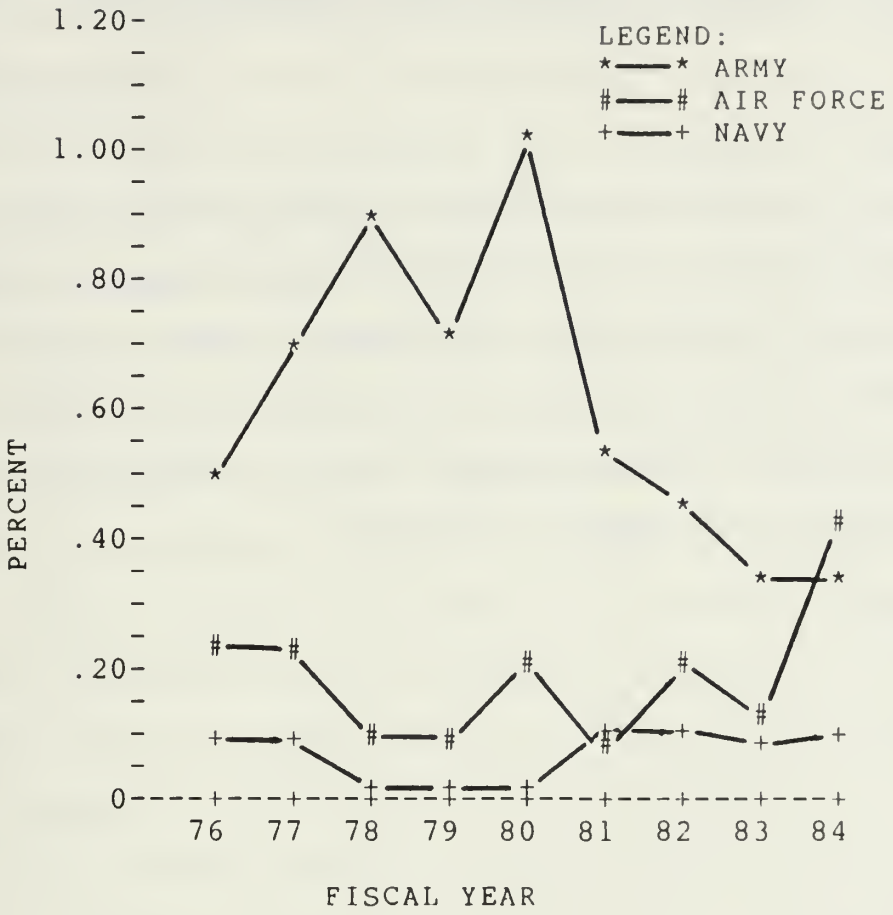


SOURCE: DOD PRODUCT ENGINEERING SERVICES OFFICE

Figure 3

VECP Savings for Each Service
(Contractor Program)

Expressed in Constant 1984 Dollars



SOURCE: DOD PRODUCT ENGINEERING SERVICES OFFICE

Figure 4

VECP Savings as Percent of Procurement TOA

Engineering program. Figure 2 points out the shift in the emphasis given VE by showing how the number of personnel dedicated to value engineering has dramatically declined from a high of 204 in fiscal year 1972 to a level of 146 in fiscal year 1976.

Figure 3 shows how each of the three military services has benefitted from the Value Engineering program. Prior to fiscal year 1984, the Army consistently outperformed the Navy and the Air Force in terms of the dollar savings achieved and also in terms of the percentage of total obligational authority (TOA) which is shown in Figure 4.

III. DOD VE PROGRAM: A COMPARISON WITH VALUE ANALYSIS

A. OVERVIEW

The purpose of this chapter is to develop an understanding of how private industry views the DOD Value Engineering Program by comparing and contrasting it to private industry's value analysis (VA) program for its commercial products. Since VE has its origins in VA, an understanding of the differences between VA in the commercial world and VE within the DOD can provide an important insight into private industry's overall perceptions of DOD's VE program. Purchasing magazine completed two very extensive surveys of purchasing managers within private industry to find out the status of value analysis. The results from these surveys will be used to portray private industry's value analysis program.

This chapter identifies two significant differences between value analysis and DOD value engineering. The first difference is that DOD value engineering is exclusively concerned with cost reduction where value analysis is more broadly applied to include other factors such as quality, safety, and marketing appeal. The second significant difference is that DOD value engineering effort is rewarded through a shared savings arrangement while value analysis programs reward suppliers with more business.

B. VALUE ANALYSIS SURVEY RESULTS

In an article published by Purchasing magazine, a purchasing manager was quoted as saying,

> A lot of our traditional stresses on negotiations and price don't measure up any more. Companies like ours are being asked to take 20-30% out of the cost of the end product. You can't do that by throwing quotes around. You've got to dig deeper. Purchasing must get into the design and function of purchased parts. [Ref. 8:p. 100]

In the commercial world, value engineering's sister program of value analysis is alive and well. In March of 1984, Purchasing magazine published the results of a very comprehensive survey which revealed that value analysis within the commercial sector is flourishing in all types of manufacturing companies. The survey, which contacted almost 2000 purchasing executives from the Fortune 10000 companies, was designed to provide a status report on value analysis and attempted to answer the following questions:

1. How old are VA programs?
2. Why have VA programs been started?
3. What has been the payback from VA?
4. What role do suppliers have in VA?
5. How does private industry motivate their supplier's participation in VA?
6. What are the ingredients to a successful VE program?

The following is a summary of what the Purchasing magazine survey revealed about private industry's value analysis programs.

1. Age of VA Programs

Even though the concept of value analysis has been around for more than 40 years, the average age of commercial value analysis programs at the time of the survey was 8.9 years and the median age was 7.5 years. Indeed, half of the purchasing managers surveyed said that their value analysis programs were five years old or less. This shows that private industry has been very slow to initiate a formal value analysis program. Table 2 summarizes how the survey respondents answered the question: "How long have VE programs been in effect?"

TABLE 2

AGE OF VA PROGRAMS

YEARS	% RESPONDENTS
0-5	50%
6-10	18%
11-15	9%
16-25	18%
Over 25	5%

2. Reasons for Starting VA

In determining what are the significant factors which cause companies to start a value analysis program, 96% of the respondents to the survey saw value analysis as a way to reduce costs. Even more importantly, 65% of the respondents saw value analysis as a way to improve quality. Table 3 summarizes how the survey respondents answered the question: "What were the primary reasons for establishing a VA program?"

TABLE 3

REASONS FOR ESTABLISHING A VA PROGRAM

REASON	% RESPONDENTS
1. Reduces costs.	96%
2. Improves quality.	65%
3. Encourages teamwork.	37%
4. Encourages supplier involvement.	31%
5. Better satisfy user's needs.	25%
6. Meet new marketing objectives.	25%

The results of the survey point out very clearly that value analysis has other benefits besides cost reduction. It is also a very effective way to stabilize costs while improving quality. Private industry is now facing a significant amount of foreign competition at a time when the U.S. dollar has been particularly strong. The Purchasing survey found that the pressures to keep costs down have been stronger. The survey found that 57% of purchasing managers who responded to the survey are planning to increase their VA programs in response to cost pressures. [Ref. 9:p. 81]

3. VA Payback

The real worth of a value analysis program to private industry is the dollar return on the dollar investment in value analysis. Respondents to the survey indicated a payback of from 3:1 to 67:1. On an average basis, the payback seems to be between 25:1 and 30:1 [Ref. 9:p. 85]. Some companies have been able to completely offset inflation and product improvement costs [Ref. 9:p. 85].

4. Role of Suppliers

Respondents to the survey revealed that a great deal of emphasis is placed on supplier participation in the value analysis process. There were four main reasons given. They are:

1. Almost every supplier is a specialist of one kind or another.
2. Technology is racing ahead so fast that no one company can keep up.
3. Make vs. buy studies favor outside procurement as companies seek to rationalize their product lines and trim overhead.
4. Factory automation puts equipment suppliers on the same value-added level as materials and parts producers.

Private industry feels that they do not always have the technical expertise that is necessary to conduct a VA program and so they are increasingly looking to their suppliers for assistance [Ref. 9:p. 89].

5. Supplier Motivation

To encourage a supplier's value analysis contributions, respondents to the Purchasing survey identified five methods to reward suppliers for their VA help. They are summarized below in Table 4.

Respondents to the survey indicated that incentive contracts that share savings are not very popular with suppliers. The main reason for this is that it can be a "cleaner" transaction to pay a supplier separately for their design assistance because anticipated volume on an item may not

TABLE 4

METHODS OF SUPPLIER REWARD

SUPPLIER REWARD	% RESPONDENTS
1. Supplier is offered more business.	86%
2. Supplier gets first order without competition.	41%
3. Supplier is paid separately for his technical help.	10%
4. Supplier gets severval orders without competition.	9%
5. Formal incentive contracts that share savings.	

develop. This would leave the supplier with unrecovered expenses [Ref. 9:p. 93]. What suppliers want, more than anything else, from their value analysis effort is more business. Consequently, purchasing managers have come to use supplier value analysis participation as a key element of supplier evaluation [Ref. 9:p. 83].

6. Key Ingredients to a Successful VA Program

Respondents to the Purchasing survey indicated that a successful value analysis program has four key ingredients. These key ingredients are:

1. A proper system for rewarding good ideas.
2. Showing suppliers that you are sincere and serious about wanting their value analysis help.
3. Techniques for sparking a supplier's interest in a specific area must have a bit of flair.
4. Ideas must not be allowed to die a lingering death while suppliers are wondering what is happening.

7. Problems with Value Analysis

Even though value analysis has been demonstrated to be such an effective means for cost control and improved

quality, value analysis must still be "sold" to various groups within a corporate organization. The March 28, 1985 issue of Purchasing was devoted entirely to the subject of selling value analysis and began with the statement,

> As those who have carried the VA [value analysis] torch over the years know, VA is something that must be continually sold and resold within the company and to suppliers. Without a well-planned sales campaign, in fact, a VA program will abort on take-off, or run out of gas long before all targets have been hit. [Ref. 8:p. 99]

A follow-up survey of purchasing managers in 1985 by Purchasing magazine revealed that a strong tendency exists for departments within a company to resist value analysis because it requires an interdepartmental team venture. Functions normally assigned to one group (e.g., design engineering) are now open for inspection by another group (e.g., purchasing) and vice versa [Ref. 8:p. 109]. If this attitude is coupled with a lack of top management support, an effective VA program will never exist [Ref. 8:p. 100]. Another area for resistence is that design engineers feel that their original specifications are already the best. Once a specification has been established, it is very difficult for the design engineer to change to something that is unknown or unfamiliar [Ref. 8:p. 108]. Additionally, operations personnel often times feel that they are in fact performing value analysis through their day-to-day work routines. A formal value analysis program is seen as being duplicative [Ref. 8:p. 113].

C. COMPARATIVE ANALYSIS

From the Purchasing magazine survey results, private industry's value analysis program can be characterized as being a relatively young program that was initiated as a result of increased foreign competition. It can also be described as involving the active participation of suppliers who are motivated to participate through the prospect of receiving more business. This characterization of value analysis presents two very significant differences between it and the DOD Value Engineering Program.

The most significant difference concerns the types of benefits achieved. The DOD VE program has its sole emphasis on cost reduction. The Federal Acquisition Regulation specifically states that in order for a VECP to be approved, there must be an overall net reduction in the costs to the Government. With private industry operating in a competitive market for its commercial goods, "value" is defined in a much broader sense to include such things as quality, safety, etc.' The General Electric Company, the original developer of value analysis techniques, has made some significant changes in the emphasis of their VA program. From a strictly cost reduction emphasis, they now emphasize quality and the achievement of designs which lend themselves to automated production. [Ref. 9:p. 101]

The DOD VE program's emphasis on cost reduction has been a criticism made by private industry for quite some time.

At a value engineering symposium conducted at the U.S. Air Force Academy in 1969, the Vice President for Product Effectiveness at Hughes Aircraft Company made the following comment about the DOD VE Program,

> The classical VE approach has been to concentrate on costs - to provide a lower cost alternative that does not degrade performance. In the expression of value as being equal to performance divided by cost, reducing cost certainly increases value. But improving performance with costs held constant also increases value. Value analysis techniques have equal validity when applied to the performance side of the ratio. Improvements in reliability (frequently a byproduct of classical VA studies) reduce costs of maintenance and support, as well as improving mission effectiveness. [Ref. 6:p. 77]

The second significant difference concerns the method by which suppliers are rewarded for their cost saving ideas. The DOD Value Engineering Program relies exclusively on the sharing of overall net savings. As was shown in Table 4, private industry has found that this is the least desirable method of rewarding suppliers for their value engineering effort. However, there is no evidence to suggest that this is a factor which works against contractor participation in the DOD VE program. In fact, in a 1977 survey that was completed by the Florida Institute of Technology, 24 defense contractors were asked a series of questions about the Value Engineering program. In response to the question: "Do you believe the current sharing formulas provide an adequate incentive?", 15 contractors said, "Yes." When asked if it was absolutely necessary to increase the percentage of savings given to industry to attract contractor participation, 17

contractors said, "No" [Ref. 10:p. 25]. It would seem, then, that private industry is willing to accept shared savings as a reward for their value engineering effort. However, as Table 4 points out, when given a choice their preference is to have more business.

IV. DOD VE PROGRAM: AN INDUSTRY VIEWPOINT

A. OVERVIEW

The purpose of this chapter is to develop an understanding of how private industry views the DOD Value Engineering Program by examining how a DOD contractor has used the DOD VE program and to learn their perceptions and concerns about DOD value engineering. The Hughes Aircraft Company was selected as the DOD contractor to be examined because Hughes has been active in the DOD VE program since its very beginning. Hughes has submitted VECPs on 52 programs involving all three of the military services and received the DOD Value Engineering Award for fiscal year 1984. Hughes, therefore, can give some very valuable insights into how DOD VE policies and processing procedures influence a contractor's motivation to participate in the DOD Value Engineering Program.

B. VALUE ENGINEERING AT HUGHES AIRCRAFT COMPANY

The Hughes Aircraft Company has had a great amount of success in working with the DOD Value Engineering Program. Since the DOD VE program's first introduction in the early 1960s, Hughes has had 705 VECPs approved on 52 programs among all three of the military services. The total negotiated savings has been $887 million with the Government's share of the savings being $719 million (computed over the

total life of the program) and Hughes' share being $168 million. Hughes' share of the savings may seem disproportionally small in comparison to the Government's share. However, Hughes' share is calculated only for the savings realized under the instant contract and future savings during the sharing period. After considering a total contractor reimbursed overhead expenditure of $64.4 million for VECP development, the Government has realized a return on reimbursed overhead of 11 to 1. This is to say that the Government has saved $11 for every $1 invested in VECPs developed and submitted by the Hughes Aircraft Company.

With such a successful record of performance in dealing with the DOD Value Engineering Program, Hughes is in a position to give very valuable insights into how private industry might view the overall DOD Value Engineering Program. To get Hughes' insights, in-depth interviews were conducted with value engineering managers at both the corporate level and the program level. At the program level, interviews were conducted with VE personnel who were assigned to programs within the Hughes' Missile Systems Group (MSG). The MSG is rather unique in that it builds a technologically similar weapon system for each of the three military services. Table 5 shows the three missile systems manufactured by Hughes and the VECP activity for each missile.

TABLE 5

VECP ACTIVITY WITHIN THE MISSILE SYSTEMS GROUP

	MAVERICK (AIR FORCE)	TOW (ARMY)	PHOENIX (NAVY)
VECPs SUBMITTED	182	189	2
VECPs APPROVED	107 (58.7%)	169 (89.4%)	2
GOVT SAVINGS	$178 mil.	$138 mil.	$14 mil.
HUGHES SAVINGS	$ 60 mil.	$ 37 mil.	$ 1 mil.

C. DEVELOPMENT OF VE IDEAS AT HUGHES

A contractor's first involvement with the DOD VE program begins with a cost saving idea. To generate cost saving ideas, Hughes has an extensive training program which is tailored to meet the needs of five different groups of VE users. VE workshops have been designed for corporate headquarters personnel, contracting personnel, cost reduction teams, and subcontractors. In the past 25 years, Hughes has trained over 8,000 personnel in the use of value engineering. With this level of exposure, Hughes has had no shortage of ideas. However, the most significant source of ideas comes from the structured workshops conducted for the cost reduction teams. A cost reduction team consists of personnel from a variety of disciplines who are assigned to study a specific component of a weapon system and to generate ideas for reducing the costs of producing the component.

Within the Hughes organization, a value engineering idea is submitted as a one page value engineering change request (VECR) that presents the idea in very basic terms and

contains very little detail. The VECR is presented to a value engineering review board which consists of the senior engineer on the program as well as the value engineering manager for the program. The review board looks at the VECR in terms of its technical feasibility and its potential financial risks and rewards. If a VECR seems as though it may be technically feasible and the financial risks are within tolerable bounds, a value engineering change authorization (VECA) is prepared. The VECA provides a more extensive definition of the technical feasibility of the idea and also provides a more in-depth estimate of the gross costs for development and implementation as well as the estimated savings on the instant contract plus future contract savings. These cost and savings estimates are generated in the same manner as Hughes would price out an engineering change proposal (ECP). The only difference, of course, would be that in the case of a VECP Hughes would identify cost savings. When the VECA is completed, overhead funds are allocated to the VECA so that the idea can be demonstrated. After the VECA has been submitted and the cost saving idea has been adequately demonstrated, an engineer is specifically assigned to the VECA to help present the idea to the Hughes Configuration Control Board (CCB). The engineer will make a presentation to the CCB so that a determination can be made as to whether or not the idea is worth investing additional overhead funds and if a full testing program is required.

If further testing is required, a final review of the completed value engineering change proposal package is made by the CCB. Once the VECP is approved by the Hughes CCB, the program's value engineering manager becomes responsible to the program manager at Hughes for processing the VECP submissions through the appropriate military purchasing activity. Hughes' program value engineering managers can be dedicated full-time to value engineering or may be assigned on a part-time basis. Currently, Hughes has four personnel assigned full-time and 54 personnel assigned part-time.

D. PERCEPTIONS AND CONCERNS

A decision by Hughes to submit a VECP comes after a very careful consideration of its technical and financial merits. With a $3 million annual budget for the development of VECPs, Hughes is looking for an appropriate return on their investment. The investment of their resources includes personnel resources as well as financial. In evaluating whether or not to pursue the development of a VECP, Hughes will first consider the relative priority of the VECP in comparison to other priorities which may surround a particular program. If a program is suffering from technical problems or is behind in meeting contract delivery schedules, then taking personnel away from a program and assigning them to value engineering may not be well received by a program manager. However, barring any conflicting priorities such as technical or schedule problems, Hughes must also evaluate the

potential for the VECP to be accepted by the Government. This is where Hughes' perceptions and concerns about the DOD VE program are of critical importance.

Hughes has learned that it is not sufficient to just submit a VECP to a government purchasing activity and to then let the Government's VECP processing procedures take over. In the experience of Hughes, a substantial amount of effort has to be completed unofficially before the submission of a VECP can occur. Otherwise, Hughes feels that a VECP has only a 30% change of being approved. By briefing the proper contracting and technical personnel at the Government purchasing activity in advance, Hughes has experienced a 59% approval rate for the MAVERICK missile and an 89% approval rate for the TOW missile.

1. Impact of Government Attitude

During this researcher's interviews with Hughes' value engineering personnel, two factors were identified as being critical to Hughes' decision as to whether or not a VECP should be submitted. The most significant factor was Hughes' perception of how receptive the program management and contracting personnel at the government purchasing activity are toward the submission of VECPs. Hughes has heard a number of senior officials within the DOD express a desire to see more participation by contractors in the DOD Value Engineering Program. However, Hughes does not see a comparable level of enthusiasm at the working level (i.e., the

government contracting officer and the program manager). Hughes has come to realize that the acceptance or rejection of a VECP is more dependent upon the working level within the Government than it is upon the senior management levels. In the experience of Hughes, some DOD program managers have flatly told Hughes that VECPs will not be approved irrespective of the merits of the VECP submitted. Of course, this is an extreme and rare situation. However, there are various degrees of receptiveness toward VECPs which are shown by government personnel and Hughes will evaluate the level that exists at a particular government purchasing activity. For example, if Hughes estimates that at a certain government purchasing activity there is only a 50% chance for a VECP to be approved, would they be willing to invest, for example, $100,000 to develop a VECP?

2. Timeliness of Government VECP Processing

A second factor which was critical to Hughes' decision as to whether or not a VECP should be submitted was the timeliness with which VECPs are processed by the government pruchasing activity. Hughes feels that many times the purchasing activities of the DOD take too long in reviewing VECPs. The Federal Acquisition Regulation states that the contracting officer shall have 45 days in which to accept or reject the VECP. However, if the Government will need more time to evaluate the VECP, then the contracting officer must notify the contractor in writing giving the reasons for

the delay and the anticipated decision date [Ref. 5:p. 48-3]. In the experience of Hughes, only one of the military services is willing to give approval or disapproval within 45 days. The other services go through a very long process that, in some cases, can take over two years to complete. The one military service that gives approval within 45 days, gives technical approval only and then immediately implements the VECP via a change order that puts a ceiling on the amount of savings that can be negotiated. When the savings to the Government has been negotiated, the definitized VECP is implemented with a contract modification. Technical implementation via a change order is advantageous to Hughes in that the VECP is implemented much more quickly and the delivery quantities over which the savings to the Government are shared are also greater. The Government also benefits because it realizes a reduction in the contract price on a greater quantity of the end item being delivered.

The other military services will not issue a change order to implement the VECP upon technical approval. Instead, the VECP submission package is reviewed for completeness, then it is granted technical approval if appropriate, and then the savings to the Government are negotiated. Once negotiations are completed, a contract modification is issued and the VECP is then implemented. In this case, Hughes is at a disadvantage because the sharing quantities under the instant contract are much less because so much

time has been spent reviewing and approving the VECP. The Government is also at a disadvantage, not only because the price reduction is not applicable to as large a quantity, but also because a VECP may require a backfit to a potentially large number of end items that have already been delivered.

Hughes is more highly motivated to submit a VECP at the beginning of a production contract that is near the end of a production contract. The reason is that production quantities remaining on the instant contract are much higher at the beginning of the contract. Consequently, the shared savings potential is much greater. However, if the time it takes the Government to approve and implement the VECP is too long, the advantage gained by submitting a VECP at the beginning of a production contract is lost. Hughes will evaluate how long a government purchasing activity will take to review and implement a VECP and may find that with certain purchasing activities the potential financial return on a VECP is too low to warrant an investment of their resources.

V. DOD VE PROGRAM: A DOD WORKING LEVEL VIEWPOINT

A. OVERVIEW

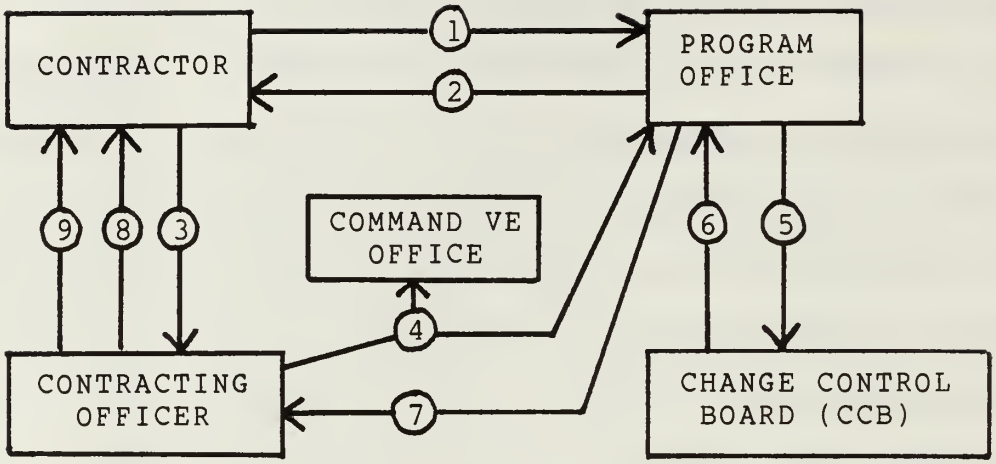
This chapter presents a generalized VECP processing sequence which shows how a typical DOD buying activity will process a VECP. This chapter concludes with a discussion of three significant concerns that program managers and contracting officers, the "working level," have about the DOD Value Engineering Program. These concerns deal with the validity of VECP cost savings estimates; the increasing requirement for up-front funding of VECP research and development costs; and, the imposition of unrealistic VE goals.

B. VECP PROCESSING

From the stand-point of a program manager or a contracting officer, a value engineering change proposal is nothing more than an engineering change proposal in which the contractor alleges that the Government will derive a cost saving if the VECP is implemented. With the exception of this one distinction, there is really no other difference between a VECP and an ECP. Both must be submitted by the contractor in accordance with the requirements set forth in DOD-STD-480A; both must receive technical approval from the buying activity's change control board (CCB); both require the availability of funds for implementation; both are subject

to cost analysis and the eventual negotiation of a price increase (or decrease in the case of a VECP); and, both are implemented through the modification of an existing contract. It is therefore not surprising that a VECP is processed in essentially the same manner as an ECP. Figure 5 shows what a typical VECP processing sequence involves. This sequence was derived from value engineering instructions and configuration management manuals published by the various DOD buying activities visited by this researcher. While Figure 5 may not exactly describe the processing of VECPs at all military activities, it does show the general pattern of processing that is usually followed.

As was pointed out in Chapter 4, a considerable amount of informal discussions and briefings must take place between the contractor and the Government prior to the submission of a VECP. DOD configuration control manuals generally restrict the ability of a contractor to submit unsolicited ECPs and, in fact, some specifically state that unsolicited ECPs shall be disapproved unless they are to correct deficiencies, make significant changes in effectiveness, or result in substantial life cycle cost savings. The normal processing of an ECP requires the contractor to first obtain an informal and unofficial agreement concerning the technical feasibility of the ECP from the military buying activity. Then, instead of the contractor submitting an ECP, the military buying activity directs an engineering change to the



1. Informal discussions/briefings
2. Unofficial and tenative agreement on the technical feasibility of the VECP.
3. Formal submission of the VECP package.
4. Distribution of the VECP to the program office and the command VE office.
5. Technical and funds availability review.
6. Technical approval or disapproval.
7. Purchase request to modify the instant contract to incorporate the VECP and possibly a change order to implement the VECP as soon as possible.
8. Negotiation of estimated savings.
9. Issuance of a contract modification for an approved VECP or the issuance of a letter disapproving the VECP.

Figure 5

Typical DOD VECP Processing Sequence

contractor who then submits a cost proposal for an equitable adjustment to the contract. In this way, the number of "unsolicited" ECPs is kept to a small number.

A VECP is subjected to the same informal and unofficial scrutiny as an ECP. However, after obtaining an unofficial agreement on the technical feasibility of the VECP from the Government, the contractor must directly submit the VECP to the contracting officer who will then distribute the VECP package to the appropriate program office for technical review and a funding availability determination. There is no such thing as the Government directing a VECP to a contractor. However, interviews with value engineering managers at Hughes revealed that military buying activities have been known to reject a VECP and then direct a no-cost ECP to the contractor. This, in effect, is a directed VECP with the contractor's share of the savings limited to the current production contract. For example, under normal circumstances, an ECP would involve the Government obligating additional funds to cover the cost of its implementation. A "no-cost" ECP means that the contractor will implement the ECP with no financial obligation to the Government. In the case of a disapproved VECP that has been converted to a no-cost ECP, the Government is telling the contractor to implement the VECP at the contractor's expense and to keep 100% of any savings generated under the instant contract. There would be no reduction in the unit price on the instant contract

and there would be no sharing of future or collateral savings.

The technical review of the VECP will be accomplished in the exact same manner as an ECP. The technical evaluation process will be structured so that all aspects of the VECP are evaluated and the results of the evaluation consolidated for presentation to the buying activity's change control board for formal technical approval. The evaluation of the VECP will include the following:

1. The relative merit of the proposed change versus the unchanged items.
2. The technical competence of personnel and the facilities required to accomplish the change.
3. The manhour backlog to incorporate changes that have already been approved.
4. The effect on spares, repair parts, data, and publications.
5. The effect on delivery schedules.
6. The effect on training and training equipment.
7. The effect on test and support equipment.
8. The availability of funds.
9. The effect on reliability and maintainability.

To consider all of the above factors, as many as 14 separate reviews would have to be made by as many different offices within a buying activity.

While the review and approval process conducted by the program office and the change control board will emphasize the technical aspects of the VECP, the determination of

funds availability will also require an evaluation of the contractor's estimated cost savings. If technical approval is granted, the VECP is returned to the contracting officer for negotiation of the cost savings and an eventual modification of the contract to incorporate the VECP. Some services will issue a change order along with technical approval of the VECP. This allows the VECP to be implemented in the end item as soon as possible. However, the change order would "ceiling price" the savings at the level proposed by the contractor. The cost savings would then be negotiated by the contracting officer who would then issue a contract modification to definitize the contract. If a change order is not issued, the VECP cannot be implemented until the cost savings to the Government are negotiated and a contract modification is issued.

A contracting officer will not question the technical decision made by the change control board or the cost saving evaluation made by the program office as part of the funds availability determination. In general, if there is a significant amount of skepticism concerning the contractor's estimate of the cost savings, a contracting officer will typically be hesitant to go through the lengthly process of negotiating the contractor's VECP cost proposal. Instead, the contracting officer would be more inclined to issue a final disapproval of the VECP on the grounds that the Government will not realize a cost savings. The contracting

officer's decision to approve or disapprove the VECP is not subject to the Disputes clause or otherwise subject to litigation under the Contracts Disputes Act of 1978 [Ref. 2:p. 48-3]. If the VECP is disapproved, the contractor has little choice but to either withdraw the VECP prior to disapproval and resubmit the VECP as a costed ECP, or accept a directed, no-cost ECP from the Government.

The Federal Acquisition Regulation states that all VECPs shall be accepted or rejected by the Government within 45 days from its receipt by the Government. However, if more time is required to evaluate the VECP, the contractor must be notified in writing and is to be given an anticipated decision date [Ref. 2:p. 48-3]. Since VECPs are processed in essentially the same manner as ECPs, the time standards that apply to ECP processing would also apply to VECP processing. ECPs are assigned priorities in accordance with the urgency of the proposed change. For example, engineering changes that are for improved safety are accorded a higher priority than non-safety related changes.

Some buying activities are capable of making a technical evaluation within 45 days if the contractor is responsible for maintaining configuration control of the end item. However, if the buying activity maintains configuration control, the technical evaluation of a routine ECP will take at least 120 days. When coupled with the audit and negotiation of the contractor's cost proposal, the implementation of a VECP can take ten months or longer.

The value engineering office at a buying activity does not play a central role in the processing of a VECP. Some commands are structured so that the contractor submits VECPs directly to the VE office rather than to the contracting officer. This is sometimes done so that VECP processing times can be more closely monitored. In general, the VE office at a buying activity has no authority to grant technical approval or to contractually obligate the Government. However, in most cases, the VE office does have the right of disapproval if strong objections are made against the contractor's VECP submission. The VE office is principally responsible for promoting the DOD Value Engineering Program within the buying activity and with the activity's contractors. The VE office also provides training to contracting and program management personnel within the activity. The overall success or failure of the activity's value engineering program is the responsibility of the VE office. However, program managers are increasingly being held responsible for the achievement of VE goals assigned to their respective programs.

C. PERCEPTIONS AND CONCERNS

During this researcher's interviews with DOD program managers and contracting officers, there was an unanimous agreement on the validity of value engineering as a cost cutting concept. However, there was little agreement as to the efficacy of the DOD Value Engineering Program. Program

managers and contracting officers have a pervasive suspicion of a contractor's claim that the Government will save money by implementing a VECP. However, no personnel interviewed by this researcher could point to specific data to substantiate their suspicions. Their suspicions were instead based on past dealings with a variety of conractors and also their personal knowledge of a program and the technology involved with it. The personnel interviewed were more than willing to accept VECPs so long as the negotiated savings to the Government could be verified through an audit of actual cost data.

There is a certain amount of validity to the suspicions of government personnel. In a report completed for the U.S. Air Force in 1975 by the RAND Corporation, the results of an audit of VECPs implemented in the F-111 was summarized. From late 1964 through early 1972, 55 VECPs were implemented in the F-111 aircraft. Actual cost data was available for 35 of the VECPs. Of these, 35, ten of the VECPs actually resulted in increased costs to the Government. Of the remaining 25 VECPs that produced an audited savings, 13 resulted in a savings which was less than originally estimated and eight VECPs resulted in a savings which was larger than originally estimated. In the case of four VECPs, the final savings equalled the estimated savings [Ref. 7:p. 10]. The RAND study went on to say that the reliability of the cost savings estimates made by the contractor is very questionable

because their savings estimates are based on inference rather than hard information [Ref. 7:p. 11].

Another significant concern among program managers and contracting officers is the fact that contractors are submitting VECPs which require a significant amount of up-front funding for research and development effort. A contractor will submit a VECP that may require up to three years of research and development before it can be implemented in the end item. Generally speaking, this type of VECP involves the development of a special application of a known technology to the end item being value engineered. Because of the long development and implementation period, no instant contract savings will be realized by the contractor. However, once the VECP is incorporated in the end-item, the contractor's share of future savings begins for a period of three years. Therefore, if the VECP requires a three year development period and the contractor also has a share of a three year future savings period, the contractor maintains an interest in the production of an end-item for a period of six years from the date the VECP is approved.

Contractors want the Government to approve VECPs of this type because it allow them to incorporate new technology into their products and therefore be more competitive for future contract awards. However, program managers and contracting officers are reluctant to provide such substantial sums of up-front money for VECPs whose savings have not yet

been demonstrated. Secondly, three years is a long time for a program to maintain a stable configuration. During this research and development time period, a number of other changes could be made which would negate or severely reduce the impact of a VECP approved three years earlier. Government personnel interviewed were basically split in their opinion on how a superceded VECP should be handled. Some felt that if a VECP was submitted in good faith, the contractor should receive their share of the savings that was negotiated and made a part of the contract, even though the Government could no longer derive a benefit from the VECP. Others felt that if a contractor submits an ECP which supercedes a prior VECP, the contractor should receive only that portion of the superceded VECP savings which is in excess of the cost associated with implementing the ECP. The rationale for this view is that a VECP must provide a savings to the Government. If the VECP is superceded during the sharing period, then the savings has been diminished and the contractor's share should also be diminished.

A final significant concern among contracting officers and program managers relates to the setting of value engineering goals. In general, value engineering goals for each of the services is measured in terms of a percentage of total obligational authority (TOA). This percentage is, of course, translated into procurement dollar goals which are assigned to each acquisition program at a buying activity. Program

managers and contracting officers strive to meet their assigned goals. However, goals that are assigned to programs without the agreement of the program manager, are seen as being unrealistic and encouraging the acceptance of VECPs which would not normally be considered under the DOD Value Engineering Program. Personnel interviewed stated that unrealistic value engineering goals must be developed within the context of the resources available and current program priorities. Value engineering goals should be established only after considering the availability of personnel resources to evaluate the VECPs, the design stability of the weapon system, and the reliability of current cost estimates against which VECP savings are computed.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. OVERVIEW

This chapter presents the conclusions and recommendations which are a result of the research effort. Three conclusions are made. The first conclusion deals with the inadequacy of the incentives offered as a reward for participation in the DOD Value Engineering Program. The second conclusion concerns the effect of processing delays on contractor motivation and the third conclusion deals with the effect of DOD "working level" attitudes toward the VE program. Based on these three conclusions, recommendations are made which offer a means to not only encourage greater contractor participation in value engineering but also to reduce the suspicions that DOD program managers and contracting officers have about VECPs.

B. CONCLUSIONS

The primary research question of this thesis is to determine how the Government's value engineering policies and processing procedures affect a contractor's motivation to participate in the DOD Value Engineering Program. From the results of the research, three conclusions can be made. The first conclusion is that the incentives offered to contractors to participate in the DOD Value Engineering Program have

been found by private industry to be ineffective in attracting supplier participation in value analysis programs for commercial products. Suppliers will allocate their scarce resources so that the incremental return on their investment is sufficient to justify their incremental costs. The return that the supplier will realize from a long-term stable business base that is his reward for participation in value analysis may be greater than the return for the short-term monetary reward offered by the DOD Value Engineering Program. Consequently, contractors who have actively participated in value analysis programs may be hesitant to allocate their limited resources to conduct value engineering on items produced for the Government. However, for manufacturers who derive a majority of their revenue from the Government, this may not be as great a factor.

The second conclusion derived from the research effort is that any delay in incorporating the VECP in the end-item significantly reduces a contractor's motivation to submit future VECPs. The main reason that a delay would have such a negative impact is that a contractor's share of instant contract savings is reduced. So long as the VECP can be incorporated in the end-item when technical approval is obtained, other types of processing delays will not have a significant impact on a contractor's motivation to submit future VECPs.

The third conclusion is that the most significant influence on a contractor's motivation to submit VECPs is the

contractor's perception of the government buying agency's willingness to fairly evaluate the VECP. The contractor has spent a considerable amount of time, effort and money in developing the VECP and they want it to be seriously considered. If the buying activity comes up with unjustifiable reasons for rejecting a VECP or if the VECP results in a directed, no-cost ECP, a contractor's motivation to submit future VECPs will be significantly reduced.

C. RECOMMENDATIONS

If the DOD Value Engineering Program is going to be successful in the future, greater contractor participation must occur. However, this is only half of the requirement. In addition to greater contractor participation, there must also be a greater willingness on the part of DOD buying activities to accept VECPs. DOD program managers and contracting officers are usually willing to accept and fund a performance enhancing engineering change. However, they are hesitant to accept and fund a value engineering change that will save the Government money on future procurements. It isn't that program managers and contracting officers do not want to save the Government money. It is a basic belief that a VECP will not result in a savings to the Government and that the contractor has ulterior motives for submitting the VECP. As a result of this suspicion, DOD program managers and contracting officers engage in a number of tactics to disapprove VECPs and to discourage their submission in the future. The

following recommendations are therefore made with the purpose of providing procedural guarantees to contractors that VECPs will be evaluated fairly. Additionally, the recommendations also address the needs of program managers and contracting officers to have better assurances that VECPs are in fact resulting in a cost savings.

The first recommendation is to do away with the requirement that VECPs be approved within 45 days. This requirement is almost impossible for the Government to meet and does nothing but create additional administrative workload for contracting officers. In order for the buying activity to do a thorough job of technically evaluating a VECP, a sufficient amount of time must be allocated. The allocation of time will depend upon the relative priority of the VECP in relation to other engineering changes that must also be evaluated. Given the fact that a routine ECP can be technically evaluated in 120 days, it would seem reasonable that a routine VECP could also be evaluated in 120 days. The 45 day approval deadline should be changed to 120 days. However, once technical approval is granted, the VECP should be immediately implemented by means of a change order. In this way, delays that may occur in negotiating the savings will not take away from the contractor's instant contract savings. The change order should "ceiling price" the savings at the level proposed by the contractor.

When technical approval has been granted and a ceiling priced change order has been issued, the VECP savings to the

Government can be negotiated. If an audit and analysis of the contractor's proposed savings estimate reveals that the Government will not accrue a savings, then the VECP can be rejected and converted to a directed ECP if the Government so desires. However, in fairness to the contractor, the disapproval of a VECP should be made subject to the Disputes clause of the contract. This will force contracting officers to provide a good and valid reason for disapproving the VECP.

If a VECP is approved and the negotiated savings to the Government is greater than $100,000, the VECP should be subject to an audit of the actual savings realized by the Government. If the actual savings is found to be less than the negotiated savings, the contractor's share of the savings should be recomputed and any difference refunded to the Government. However, if the actual savings to the Government is greater than the negotiated savings, then the contractor's share should be recomputed and any difference should be given to the contractor. In this way, program managers and contracting officers at the buying agencies will know whether or not a savings was actually achieved and, as a consequence, their willingness to accept a VECP will be increased. The contractor will feel protected from having his VECP converted into a no-cost ECP and, having recourse under the Disputes clause, will know that the VECP will be evaluated fairly. Additionally, contractors will have an incentive to meet or exceed the cost savings achieved by the VECP because the VECP savings will be validated through an audit.

In light of the increasing emphasis on the competitive award of government contracts, the non-competitive award of future contracts as an incentive for contractor participation in the DOD Value Engineering Program is not considered by this researcher to be realistic. However, a similar result can be approximated by including in a request for proposal (RFP) the requirement that the contractor's value engineering program be described as part of the contractor's cost proposal. By making value engineering a part of the cost proposal, a greater awareness of value engineering will be created among government contracting officers. Contractors who have maintained an effective value engineering program will gain a competitive edge over contractors who have not. All other factors being equal, the contractor with the best value engineering program will be awarded the contract. This can be an especially effective technique to promote value engineering in today's environment where cost is given equal weight with technical requirements. The Government will not be awarding contracts non-competitively but will still recognize a contractor's overall desire to be rewarded for participating in the DOD Value Engineering Program by receiving more business.

D. RECOMMENDATIONS FOR FURTHER RESEARCH

As the DOD includes in more of its acquisition strategies the development of a second production source, new procedures are going to be needed to control the concurrent development

of a VECP, the allocation of VECP savings, and the implementation of the VECP in the production lines of both contractors. Research is necessary to explore various methods by which VECPs can be processed under dual source production.

Very little research has been conducted on the DOD in-house value engineering program. Some of the military services have a very extensive value engineering program at their depots and laboratories. There is little understanding of how the DOD in-house value engineering program complements or supplements the DOD Value Engineering Program for contractors. Research which compares and contrasts the two programs and their achieved savings may provide some useful insight into how the DOD should structure its value engineering effort in the future.

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